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Job No.: CTCE/BBMP/KRIDL/W.No.07/BM/Bitumen/2017-18 09.02.2018

TEST REPORT ON BITUMEN CONTENT DETERMINATION OF BITUMINOUS MACADAM MIX

* Customer	:	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
* Agency	:	**Executive Engineer,** KRIDL, Bangalore.
* Name of work	:	Improvements to roads and drain in LNT compound road to Byatarayanapura, in Ward No.07, Byatarayanapura , BBMP, Bangalore.
* Reference	:	AEE/Kodugehalli S D/PR/57/2017-18 Dated: 05.01.2018
* Sample ID	:	Road in Byatarayanapura, in ward no.07
Technical Reference	:	IRC:SP:11-1984
Date of Testing	:	09.02.2018

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	482	482
3. Weight of Asphalt and Mineral matter Extracted, g		-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	18	18.00
7. Bitumen content in %	3.60	3.60
8. Average	**3.60**	

*Information is furnished by the Customer/Representative.

Note:

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Þ The results indicated above are based on the tests carried out on the samples collected by the laboratory

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Assistant Executive Engineer, Kodigehalli Sub Division, Bruhat Bangalore Mahanagara Palike, Bangalore-560092

AE(W2)

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Job No.: CTCE/BBMP/KRIDL/W.No.07/BM/Bitumen/2017-18 09.02.2018

TEST REPORT ON GRADATION OF BITUMINOUS MACADAM MIX

* Customer	:	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
* Agency	:	**Executive Engineer,** KRIDL, Bangalore.
* Name of work	:	Improvements to roads and drain in LNT compound road to Byatarayanapura, in Ward No.07, Byatarayanapura , BBMP, Bangalore.
* Reference	:	AEE/Kodugehalli S D/PR/57/2017-18 Dated: 05.01.2018
* Sample ID	:	Road in Byatarayanapura, in ward no.07
Technical Reference	:	IS:2386 and IRC:SP:11-1984
Date of Testing	:	09.02.2018

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-04 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
26.5	0	0	0.00	100	100
19	36.15	7.50	7.50	92.50	90-100
13.2	80.25	16.65	24.15	75.85	56-88
4.75	250.7	52.01	76.16	23.84	16-36
2.36	51.26	10.63	86.80	13.20	4-19
0.3	25.74	5.34	92.14	7.86	2-10
0.075	6.25	1.30	93.43	6.57	0-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-04 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
26.5	0	0	0.00	100	100
19	38.41	7.97	7.97	92.03	90-100
13.2	80.25	16.65	24.62	75.38	56-88
4.75	258.2	53.57	78.19	21.81	16-36
2.36	50.4	10.46	88.64	11.36	4-19
0.3	30.25	6.28	94.92	5.08	2-10
0.075	5.84	1.21	96.13	3.87	0-8

*Information is furnished by the Customer/Representative.

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Job No: CTCE/BBMP/KRIDL/W.No.07/BM/Agg.G/2017-18 09.02.2018

TEST REPORT ON GRADATION OF AGGREGATES

* Customer	:	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
* Agency	:	**Executive Engineer,** KRIDL, Bangalore.
* Name of work	:	Improvements to roads and drain in LNT compound road to Byatarayanapura, in Ward No.07, Byatarayanapura , BBMP, Bangalore.
* Reference	:	AEE/Kodugehalli S D/PR/57/2017-18 Dated: 05.01.2018
* Sample ID	:	Hot Mix Plant, Bangalore
Technical Reference	:	IS : 2386(Part -1)-1963 (RA-2011)
* Type of Mix	:	Bituminous Macadam
Date of Testing	:	09.02.2018

Total Weight of Sample: **5250** gm

Sieve Size, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
26.5	0	0	0	100	100	Gradation satisfies Grade-II MORTH Table 500-4 specification
19	365	6.95	6.95	93.05	90-100	
13.2	1680	32.00	38.95	61.05	56-88	
4.75	1485	28.29	67.24	32.76	16-36	
2.36	1125	21.43	88.67	11.33	4-19	
0.3	250	4.76	93.43	6.57	2-10	
0.075	95	1.81	95.24	4.76	0-8	

Total Weight of Sample: **5150** gm

Sieve Size, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
26.5	0	0	0	100	100	Gradation satisfies Grade-II MORTH Table 500-4 specification
19	415	8.06	8.06	91.94	90-100	
13.2	1585	30.78	38.83	61.17	56-88	
4.75	1670	32.43	71.26	28.74	16-36	
2.36	945	18.35	89.61	10.39	4-19	
0.3	380	7.38	96.99	3.01	2-10	
0.075	100	1.94	98.93	1.07	0-8	

* Information is furnished by the Customer/Representative

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Job No.: CTCE/BBMP/KRIDL/W.No.07/CSR-01/537a/QB(BC)/2017-18 09.02.2018

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

* Customer	:	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
* Agency	:	**Executive Engineer,** KRIDL, Bangalore.
* Name of work	:	Improvements to roads and drain in LNT compound road to Byatarayanapura, in Ward No.07, Byatarayanapura , BBMP, Bangalore.
* Reference	:	AEE/Kodugehalli S D/PR/57/2017-18 Dated: 05.01.2018
* Sample ID	:	Bitumen
Source/ Location	:	Hot Mix Plant, Bangalore.
Sample Received on	:	07.02.2018
Period of Testing	:	09.02.2018

The results of the tests conducted on the bitumen sample are as follows:

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	IS :1203 -1978 (RA-2014)	87	80 to 100
2	Softening point, ^{0}C	IS :1205 -1978 (RA-2014)	45	Min. 40
3	Ductility at 27^{0}C, cm	IS :1208 -1978 (RA-2014)	100 >	Min.75
4	Flash Point, ^{0}C	IS :1209 -1978 (RA-2014)	303	Min. 220

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VIDYARANI P.K.
Technical Manager

AE(Qty)

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Job No.: CTCE/BBMP/KRIDL/W.No.07/BC/AIV/2017-18 09.02.2018

TEST REPORT ON IMPACT VALUE OF AGGREGATES

* Customer	:	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
* Agency	:	**Executive Engineer,** KRIDL, Bangalore.
* Name of Work	:	Improvements to roads and drain in LNT compound road to Byatarayanapura, in Ward No.07, Byatarayanapura , BBMP, Bangalore.
* Reference	:	AEE/Kodugehalli S D/PR/57/2017-18 Dated: 05.01.2018
* Sample ID	:	Hot mix plant, Bangalore.
* Type of Mix	:	Bituminous Concrete
Technical Reference	:	IS: 2386 (Part- 4)-1963 (RA-2011)
Date of Testing	:	09.02.2018

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	380	382	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	78	88	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	302	294	
4	Aggregate Impact value = percent fines 100* (W2/W1) percent	20.53	23.04	**21.78**

*Information is furnished by the Customer/Representative.

Comments:

→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%

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Job No.: CTCE/BBMP/KRIDL/W.No.07/BC/Shape.T/2017-18 09.02.2018

TEST REPORT ON FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

* Customer	:	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
* Agency	:	**Executive Engineer,** KRIDL, Bangalore.
* Name of Work	:	Improvements to roads and drain in LNT compound road to Byatarayanapura, in Ward No.07, Byatarayanapura , BBMP, Bangalore.
* Reference	:	AEE/Kodugehalli S D/PR/57/2017-18 Dated: 05.01.2018
* Sample ID	:	Hot mix plant, Bangalore
Technical Reference	:	IS : 2386(Part -1)-1963 (RA-2011)
* Type of Mix	:	Bituminous Concrete
Date of Testing	:	09.02.2018

Sl.No.	Description	Result
1	Flakiness Index	12.18%
2	Elongation Index	13.15%
3	Combined Flakiness & Elongation Index	25.33%

*Information is furnished by the Customer/Representative.

Comments:

→ Maximum allowable Flakiness & Elongation Index for Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/KRIDL/W.No.07/BC/Stripping/2017-18 09.02.2018

TEST REPORT ON STRIPPING VALUEOF ROAD AGGREGATES (STATIC IMMERSION TEST)

*** Customer**	:	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
*** Agency**	:	**Executive Engineer,** KRIDL, Bangalore.
*** Name of Work**	:	Improvements to roads and drain in LNT compound road to Byatarayanapura, in Ward No.07, Byatarayanapura , BBMP, Bangalore.
*** Reference**	:	AEE/Kodugehalli S D/PR/57/2017-18 Dated: 05.01.2018
Technical Reference	:	IS: 6241
*** Type of Mix**	:	Bituminous Concrete
Date of Testing	:	09.02.2018

Type of binder : 80/100
Percentage of binder used : 5.00% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.00 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.3	3.33	96.67
2	3.3		
3	3.4		

*Information is furnished by the Customer/Representative.

Comments:

→ Minimum allowable Aggregate retained coating for Bituminous Concrete is 95%

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Assistant Executive Engineer
Kodigehalli Sub Division
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Job No.: CTCE/BBMP/KRIDL/W.No.07/BC/Sp_Wa/2017-18

10.02.2018

TEST REEPORT ON SPECIFIC GRAVITY AND WATER ABSORPTION

* Customer	:	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
* Agency	:	**Executive Engineer,** KRIDL, Bangalore.
* Name of Work	:	Improvements to roads and drain in LNT compound road to Byatarayanapura, in Ward No.07, Byatarayanapura , BBMP, Bangalore.
* Reference	:	AEE/Kodugehalli S D/PR/57/2017-18 Dated: 05.01.2018
* Sample ID	:	Hot mix plant, Bangalore
Technical Reference	:	IS : 2386(Part -3)-1963 (RA-2011)
* Type of Mix	:	Bituminous Concrete
Date of Testing	:	10.02.2018

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2017	2015	2018	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1239	1238	1263	
4	Weight of saturated surface dry aggregate in air	W_3 g	2021	2022	2024	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	782	784	761	
6	Weight of oven dried aggregate	W_4 g	2012	2013	2012	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.573	2.568	2.644	2.595
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.603	2.597	2.686	2.629
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.45%	0.45%	0.60%	0.50%

*Information is furnished by the Customer/Representative.

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Concrete is 2.0%

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Job No: CTCE/BBMP/KRIDL/W.No.07/BC/Bitumen/2017-18 10.02.2018

TEST REPORT ON BITUMEN CONTENT OF BITUMINOUS CONCRETE MIX

* Customer	:	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
* Agency	:	**Executive Engineer,** KRIDL, Bangalore.
* Name of Work	:	Improvements to roads and drain in LNT compound road to Byatarayanapura, in Ward No.07, Byatarayanapura , BBMP, Bangalore.
* Reference	:	AEE/Kodugehalli S D/PR/57/2017-18 Dated: 05.01.2018
* Sample ID	:	Road in Byatarayanapura, in ward no.07
Technical Reference	:	IRC:SP:11-1984
Date of Testing	:	10.02.2018

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BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	473	472
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	27	28.00
7. Bitumen content in %	5.40	5.60
8. Average	**5.50**	

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Assistant Executive Engineer Kodigehalli Sub Division BBMP Bangalore

AE(WD)

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Job No: CTCE/BBMP/KRIDL/W.No.07/BC/Bitumen/2017-18 10.02.2018

TEST REPORT ON BITUMEN CONTENT AFTER GRADATION DETERMINATION OF BITUMINOUS CONCRETE MIX

* Customer	:	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
* Agency	:	**Executive Engineer,** KRIDL, Bangalore.
* Name of Work	:	Improvements to roads and drain in LNT compound road to Byatarayanapura, in Ward No.07, Byatarayanapura , BBMP, Bangalore.
* Reference	:	AEE/Kodugehalli S D/PR/57/2017-18 Dated: 05.01.2018
* Sample ID	:	Road in Byatarayanapura, in ward no.07
Technical Reference	:	IS 2386 and IRC:SP:11-1984
Date of Testing	:	10.02.2018

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-18 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	41.6	8.79	8.79	91.21	79-100
9.5	32.51	6.87	15.67	84.33	70-88
4.75	76.28	16.13	31.79	68.21	53-71
2.36	62.58	13.23	45.03	54.97	42-58
1.18	50.41	10.66	55.68	44.32	34-48
0.6	55.3	11.69	67.37	32.63	26-38
0.3	54.2	11.46	78.83	21.17	18-28
0.15	41.2	8.71	87.54	12.46	12-20
0.075	32.5	6.87	94.41	5.59	4-10

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-18 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	40.5	8.58	8.58	91.42	79-100
9.5	42.5	9.00	17.58	82.42	70-88
4.75	60.8	12.88	30.47	69.53	53-71
2.36	70.2	14.87	45.34	54.66	42-58
1.18	60.2	12.75	58.09	41.91	34-48
0.6	55.1	11.67	69.77	30.23	26-38
0.3	32.5	6.89	76.65	23.35	18-28
0.15	30.17	6.39	83.04	16.96	12-20
0.075	42.5	9.00	92.05	7.95	4-10

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Job No.: CTCE/BBMP/KRIDL/W.No.07/BC/Agg/2017-18 10.02.2018

TEST REPORT ON GRADATION OF AGGREGATE

* Customer	:	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
* Agency	:	**Executive Engineer,** KRIDL, Bangalore.
* Name of Work	:	Improvements to roads and drain in LNT compound road to Byatarayanapura, in Ward No.07, Byatarayanapura , BBMP, Bangalore.
* Reference	:	AEE/Kodugehalli S D/PR/57/2017-18 Dated: 05.01.2018
* Sample ID	:	Bituminous Concrete
Technical Reference	:	IS : 2386(Part -1)-1963 (RA-2011)
* Type of Mix	:	Hot mix plant, Bangalore
Date of Testing	:	10.02.2018

Total Weight of Sample: **5120** gm

Sieve Size, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	JOBMIX Gradation as per MORTH	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per `MORTH 500-18
13.2	755	14.75	14.75	85.25	79 - 100	
9.5	545	10.64	25.39	74.61	70 - 88	
4.75	630	12.30	37.70	62.30	53 - 71	
2.36	520	10.16	47.85	52.15	42 - 58	
1.18	515	10.06	57.91	42.09	34 - 48	
0.600	535	10.45	68.36	31.64	26 - 38	
0.300	585	11.43	79.79	20.21	18 - 28	
0.150	340	6.64	86.43	13.57	12 - 20	
0.075	310	6.05	92.48	7.52	4 - 10	

Total Weight of Sample: **5150** gm

Sieve Size, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	JOBMIX Gradation as per MORTH	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per MORTH 500-18
13.2	645	12.52	12.52	87.48	79 - 100	
9.5	550	10.68	23.20	76.80	70 - 88	
4.75	680	13.20	36.41	63.59	53 - 71	
2.36	545	10.58	46.99	53.01	42 - 58	
1.18	635	12.33	59.32	40.68	34 - 48	
0.600	480	9.32	68.64	31.36	26 - 38	
0.300	540	10.49	79.13	20.87	18 - 28	
0.150	385	7.48	86.60	13.40	12 - 20	
0.075	510	9.90	96.50	3.50	4 - 10	

*Information is furnished by the Customer/Representative.

Note:

⇒The report shall not be reproduced, except in full, without the written approval of the laboratory.

⇒The results indicated above are based on the tests carried out on the samples received in the laboratory.

⇒Any Query regarding the report must be reported within 30 days from the date of testing.

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CIVIL-TECH CONSULTANTS AND ENGINEERS

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Job No.: CTCE/BBMP/KRIDL/W.No.07/BC/Stability/2017-18 10.02.2018

TEST REPORT ON MARSHALL STABILITY OF MIX

* Customer	:	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
* Agency	:	**Executive Engineer,** KRIDL, Bangalore.
*Name of the Work	:	Improvements to roads and drain in LNT compound road to Byatarayanapura, in Ward No.07, Byatarayanapura , BBMP, Bangalore.
*Reference	:	AEE/Kodugehalli S D/PR/57/2017-18 Dated: 05.01.2018
* Source	:	Hot mix Plant, Bangalore
* Type of Mix	:	Bituminous Concrete
Date of Testing	:	10.02.2018

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshall Stability (Kn at 60° C)	9.05	9.20	9 Kn (min)
2	Marshall flow(mm)	2.35	3.60	2 – 4
3	Voids in Compacted Mix %	3.25	4.40	3 – 6
4	Percent air voids in Mineral Aggregate (VMA)	13.20	14.60	13 - 15
5	Percent Voids filled with Bitumen(VFB)	66.25	68.60	65 - 75
6	Density, g/cc	2.26	2.27	--

*Information is furnished by the Customer/Representative.

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